Environment and Natural Resources Trust Fund
2020 Request for Proposals (RFP)

Project Title: **ENRTF ID: 237-F**

Shifting Savannas: Assessing Management of At-Risk Sites

Category: F. Methods to Protect, Restore, and Enhance Land, Water, and Habitat

Sub-Category:

Total Project Budget: $ 351,754

Proposed Project Time Period for the Funding Requested: June 30, 2023 (3 yrs)

Summary:

We propose to survey Central and Southern Minnesota savannas and prairies to develop assessments measuring the success of restorations and train practitioners on management practices that promote robust sites.

Name: Matthew Kaproth

Sponsoring Organization: Minnesota State University Mankato

Job Title: Assistant Professor

Department: Science, Engineering & Technology - Dept. of Biological Sciences

Address: 242 Trafton Science Center South

Mankato MN 56001

Telephone Number: (507) 389-2787

Email matthew.kaproth@mnsu.edu

Web Address:

Location:

Region: Central, Metro, Southwest, Southeast

County Name: Anoka, Blue Earth, Brown, Dodge, Faribault, Fillmore, Freeborn, Houston, Isanti, Le Sueur, Mower, Nicollet, Olmsted, Rice, Steele, Waseca, Watonman, Winona

City / Township: Mankato

Alternate Text for Visual:

We will assess health and ecosystem functions of twenty savanna/prairie sites. We will support and conduct demonstrations of methods for managing healthy sites with our community partners and practitioners. (see email for graphic)

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____%

PROJECT TITLE: Shifting Savannas: Assessing Management of At-Risk Sites

I. PROJECT STATEMENT

Outside of the MN Prairie Plan the state has environments that are at risk of degradation; we propose to survey Central and Southern Minnesota savannas and prairies to develop assessments measuring the success of restorations and train practitioners on management practices that promote robust sites. Our work will provide necessary *Methods to Protect or Restore Land and Habitat* for public and private stakeholders to identify areas of need and efficient/successful methods of site management. The work will focus on land that had received public money (e.g. Legacy funds, CRP, CREP and RIM easements) but are at risk of degrading due to expiration of funding and pressure from climate change. While the ongoing MN Prairie Conservation Plan is working on western prairies, our focus will be on unique central and southern regions not currently being addressed. This work has not been completed before – and a unified methodology for measuring conservation sites is needed to detect priorities and opportunities that can ensure higher quality natural resources and healthy environments. We aim to work closely with ongoing projects - sharing methods from established wetland restoration assessments, ecological economics *and* established LCCMR monitoring requirements to provide managers a metric of a site's current health and specific deficiencies. To do so, we will:

- Work with private stakeholders that received public funding to identify areas of need in management assessment
- Coordinate methods and data reporting with agencies to compliment statewide efforts
- Survey savannas/prairies in Southern and Central MN (Anoka Sand Plains)
- Identify species best adapted to a changing climate and methods of how to manage them
- Archive surveys so the methods of successful land management can be identified and used elsewhere (long-term dissemination of current science to practitioners)
- Create environmental education webinars/videos and lead workdays to implement land management through community-based efforts

The restoration efforts of government and private stakeholders has help to develop over 1.3 million acres of prairies (in state and beyond). In total, more than $700 million has been invested in prairie restoration by three programs alone (CRP, CREP and RIM easements). Despite interest of stakeholders (e.g. The Prairie Enthusiasts (TPE), Pheasants Forever, MN DNR, US FWS), permanent easement holders have had limited contact with resource professionals to assess management needs such as prescribed fires & invasive species control – especially after public money has run out. This project will help to aid practitioners with best methods training and develop a convention for determining conservation success beyond biodiversity, with aim of providing continuing returns from public money investments.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1 Title: *Assess site functions & link management to successful outcomes*

Description: We will measure the condition of functional services and health of twenty sites not addressed by the MN Prairie Conservation Plan, primarily three major outstate regions (Central, SW & SE). Compared to western prairies, these regions have wetter environments and host savannas/prairies with different species and have greater woody plant encroachment. Climate change will cause dramatic droughts in these systems and may alter species composition considerably.

Working with restoration partner stakeholders (The Prairie Enthusiasts, local practitioners), we will develop qualities of measurable functions (health, biodiversity, resilience, market value, non-market valuations). The field intensive surveys will employ seven student assistants, including two graduate students in biology. We will also record management histories for each site and analyze patterns of the assessment surveys and management practices. The combined assessments will be used to prescribe methods for site improvement using specific

management practices. We will also quantify the market and non-market value provided by these lands – providing monetary ranges in terms of water retention, carbon sequestration and soil enrichment, etc.

ENRTF BUDGET: $207,699

Outcome	Completion Date
1. Coordinate data collection & reporting methods with state agencies	*Spring 2021*
2. Field surveys across central & southern savannas/prairies (>20 sites) years 1 & 2 at private and community-managed sites	*Fall 2022*
*3. **Develop evaluation tool for future sites:** Correlate field survey data of site health and functional services with management methods. Predictive tool will guide future management and help identify species at risk to a changing climate.*	*Spring 2023*
4. Archive field collections in the MSU Herbarium & digitize for Minnesota Biodiversity Atlas	*Spring 2023*

Activity 2 Title: *Education and implementation – develop workdays and training materials*
Description: We will conduct demonstrations of supported methods for managing sites in partnership with TPE - this training and implementation of community-based efforts will lead to conserving natural resources not within the DNR Prairie Plan. Using our research data, we will develop savanna and prairie restoration education resources. We would create an MSU and TPE website with a central online repository with digitized data and educational materials on *disturbance such as fire to promote savanna and prairie health for land sites* held by the community. This activity focuses on sites that may require unique disturbance restoration methods due to wetter environments (these methods are not highlighted in the University of Minnesota's Ecological Management Certificate Program Webinars). Our publications, workshops and work/field days would focus on Southern Minnesotan landowners and practitioners.

ENRTF BUDGET: $144,055

Outcome	Completion Date
1. Create a Savanna/Prairie Restoration Scientific and Education Advisory Group to Target Practitioners	*Fall 2020*
2. Digitize and centralize online video and educational materials on MSU and TPE websites focused on utilizing disturbance such as fire to promote restoration health	*Spring 2022*
3. Disseminate publications, workshops, work / field days on prairie research & restoration focused on controlled burning / fire management and why disturbance promotes native species	*Summer 2023*

III. PROJECT PARTNERS AND COLLABORATORS: Matthew Kaproth and Robyn Ceurvorst
Partners NOT receiving ENRTF funding

Name	Title	Affiliation	Role
Chris Kirkpatrick	Executive Director	The Prairie Enthusiasts	Education and Insurance Partner
Randy Schindle	Forestry Specialist	Many Rivers Chapter, TPE	Data and Activity Partner

IV. LONG-TERM IMPLEMENTATION AND FUNDING:
After years of projects investing in lands and restorations, there is a danger of savannas and prairies degrading without continued management – especially in the face of climate change shifting savannas into prairies. Our community-workdays, publications, videos and websites (see Activity 2) will identify methods of successful site restorations and build resources for practitioners. No long-term funding required.

Attachment A: Project Budget Spreadsheet
Environment and Natural Resources Trust Fund
M.L. 2020 Budget Spreadsheet
Legal Citation:
Project Manager: Dr. Matt Kaproth
Project Title: Shifting Savannas: Assessing Management of At-Risk Sites
Organization: Minnesota State University Mankato
Project Budget: $351,754
Project Length and Completion Date: 7/01/2020 - 6/30/2023
Today's Date: April 15, 2019

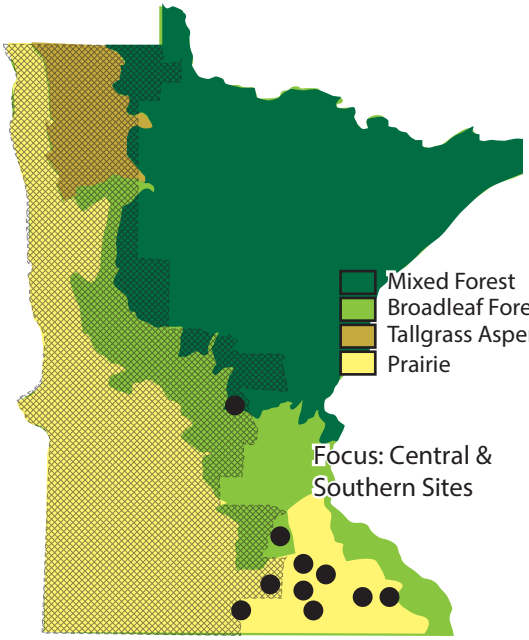
ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget	Amount Spent	Balance
BUDGET ITEM			
Personnel (Wages and Benefits)	**$311,754**		
Dr. Matthew Kaproth, Project Manager - Activities 1&2; 3 credit course release/year w/ 42% fringe rate; 15 summer duty days w/ 19% fringe (14% FTE per year for 3 years)	$65,030		
Dr. Robyn Ceurvorst, Co-Principal Investigator - Activities 1&2; 15 summer duty days w/ 19% fringe (5.8% FTE per year for 3 years)	$22,894		
2 MSU MS graduate student Research Assistants (RAs) w/ tuition; RA fall and spring w/ 49% fringe rate; RA summer w/ 19% fringe (100% FTE per year for 2 years) - 1 student would primarily work on measurement methods and analysis of Activities 1; 1 student would primarily work on Activity 2 - dissemination of research tools, educational material and implementing workdays	$81,758		
2 MSU Mankato undergraduate student field assistants for Activity 1 site surveys and Activity 2 educational videos/web updating ($10.70/hour, 500 hours); summer and fall for 3 years	$39,747		
3 MSU Mankato MANK student herbarium assistants - Activity 1&2; Plant preservation and digitization; $10.50/hour, 400 hours, part-time over 3 years	$4,200		
1 Technical Assistant - junior scientist to organize fieldwork teams, process water/soil/genetic samples, processes & achieve data for Activities 1&2; 100% FTE w/ 38% fringe; 1.5 years	$98,125		
Equipment/Tools/Supplies	**$17,500**		
Field supplies for Activity 1: *Cameras to monitor animal biodiversity/videography for educational training, clipboards/waterproof notebooks, reference books, plant press material for herbarium collections and sterile collection bags for plant, soil and microbe collection;* ***Citizen workday supplies for Activity 2*** *to demonstrate recommended management methods on a 10 acre site: Burn crew clothes and safety equipment, fuel for prescribed fires, shovels, flappers, clippers, native prairie seed, water, snacks, gloves)*	$9,700		
Lab supplies for Activity 1: *Water and soil testing (carbon, nitrogen, phosphorous $20/sample * 200 samples); Plant stress tolerance testing: Osmometer standards, liquid nitrogen ($500); Genetic sequencing for biodiversity measurements: Plant genetic variation (genotypes and ecotypes) of native prairie plants ($25/sample * 100);* ***Activity 2:*** *Printing services for educational handouts, mailings ($500)*	$7,800		
Travel expenses in Minnesota	**$ 20,250**		
Field site surveys to savanna/prairie sites in MN for Activities 1&2 ($0.54/mile, 60 trips within a 100 radius)	$ 4,170		
Fleet rental for in-state field surveys >100 miles for Activities 1&2 (40 trips, $55/day, 2-day per trip)	$ 4,400		
Field surveys room & board for Activities 1&2 (field station rates) ($64 2-day trips, 3 people, 40 trips)	$ 7,680		
Conference presentations for Activities 1&2; The Prairie Enthusiasts annual meetings (4 people, 2 meetings)	$ 4,000		
Other	**$ 2,250**		
Training curriculum: Restoring Minnesota Ecological Restoration Online Courses - Site Assessment and Monitoring Ecological Restoration, training for 3 junior scientists; $375/course x 6	$ 2,250		
COLUMN TOTAL	**$ 351,754**		

SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT	Status	Amount	Spent	Balance
Non-State:		**$ 5,250**		
Private donations (through MSU, The Prairie Enthusiasts)	*Secured*	$ 1,250		
Darlene & William Radichel Herbarium Endowment, MSU, Mankato, MN (MANK)	*Secured*	$ 4,000		
State:	*N/A*	$ -		
In-kind:		**$ 104,421**		
Dr. Robyn Ceurvorst, Co-Principal Investigator, MNSU; 8.1% FTE (3 credit Fall Release)	*Secured*	$ 12,210		
All equipment matched by MSU Mankato (12% overhead: computers, video recording and editing, data achieve and hosting, analysis software, freezers, student volunteer/internships, award administration, MSU Technical Assistant office/phone)	*Secured*	$42,211		
Randy Schindle, Prairie Enthusiasts; consultation, records, access to sites, practitioner training/videos	*Secured*	$20,000		
Private land owners, The Prairie Enthusiasts consultations, expertise, prescribed fire burn crew equipment/insurance	*Secured*	$30,000		

Other ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS	Amount legally obligated but not yet spent	Budget	Spent	Balance

Shifting Savannas: Assessing Management of At-Risk Sites

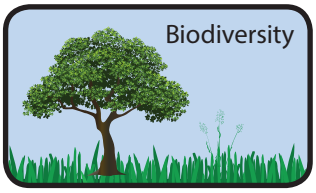
Activity 1: Assess Site Functions & Management

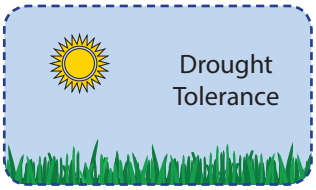


Prairie Conservation Plan Area

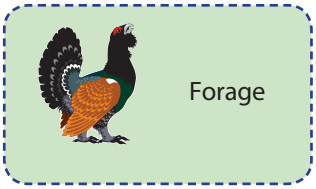
- Coordinate data collection & reporting
- Survey 20 sites
- Develop evaluation tool to guide management
- Archive field collections

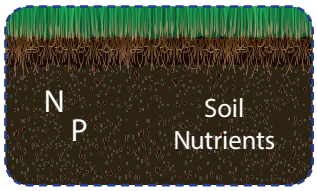
HEALTH



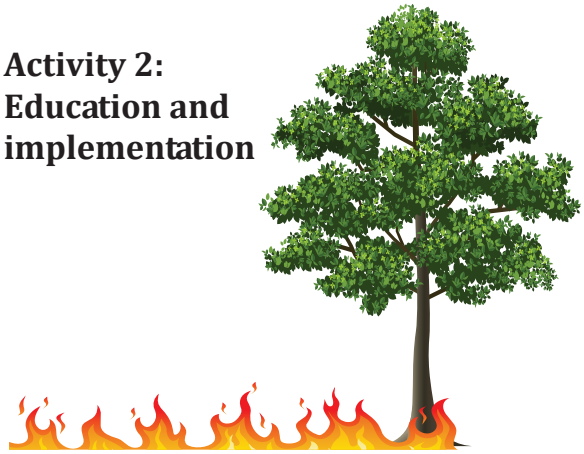


FUNCTION



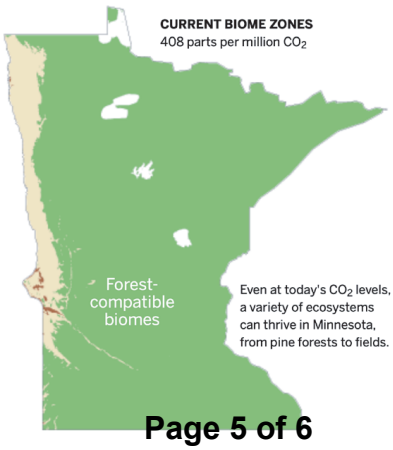


Activity 2: Education and implementation

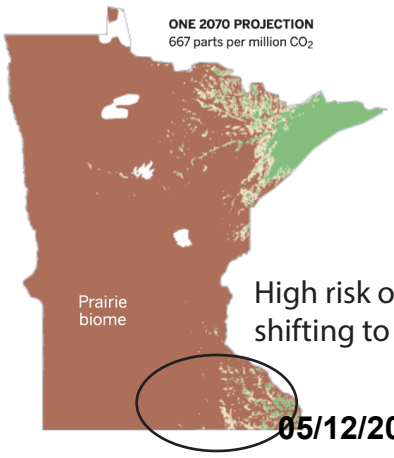


- Form Restoration Advisory Group
- Digitize educational materials
- Hold training outreach + Prescribed fire workshops

Today, Minnesota's climate supports forests and trees



In 50 years, climate change could turn most of it to prairie



High risk of savannas shifting to prairies

Images used with permission from Minneapolis Star Tribune. Data from Lee Frelich.

Project Manager Qualifications

Matthew A. Kaproth, PhD

Address: Minnesota State University, Mankato, Department of Biological Sciences, 415 Malin Avenue, Mankato, MN 56001 Ph. (507) 389-2787 Fax (507) 389-2788 matthew.kaproth@mnsu.edu

Professional preparation:
PhD in Plant Biology, University of Vermont (UVM), 2013
MS in Biology, West Virginia University (WVU), 2008
BS in Environmental Science, BS in Earth Science, State University of New York College at Brockport, 2004

Professional appointments:
- Assistant Professor, Minnesota State University, Mankato, Dept. of Biological Sciences 2016-current
- Director of the Darlene and William Radichel Herbarium (MANK), Minnesota State University, Mankato, Dept. of Biological Sciences 2016-current
- Adjunct Faculty, Saint Catherine University, St. Paul, Dept. of Biology 2016
- Postdoctoral Research Associate, UMN Twin Cities, Dept. of Ecology, Evolution and Behavior 2012-2016

Professional experience:
- 15 years of experience in prairie or related systems (environmental science, invasive species biology, plant biology, botany, ecology, sustainability science). 10 publications on prairie species, invasive plant species/management and biodiversity. Hired, trained and mentored over 18 students on related ecological, environmental science and/or plant biology projects. Presented >20 research projects at regional, national and international meetings.
- Managed logistics and reported progress on 10 projects awarded from various funding sources: Federal (USDA, NSF), State (UMN UROP, WV View) or private/organizational (The Prairie Enthusiasts, MANK herbarium, MSU Mankato startup, HHMI UMN). Direct research and curation of the Darlene & William Radichel Herbarium (MANK) with a $110,000 endowment.
- Certified Wetland Delineator (MN training in soils, plant identification and hydrology) 2016-current

Organization Description

Minnesota State University, Mankato is an educational institute delivering courses, research and training for future practitioners. Set in outstate, it's mission is to promote learning through effective undergraduate and graduate teaching, scholarship, and research in service to the state, the region and the global community.

College of Science, Engineering and Technology (CSET) Mission - As educational leaders in science, technology, engineering, and mathematics (STEM), our accessible faculty advances student scholarship through innovative teaching, research expertise, and the exploration of new technologies and ideas. We prepare our students for professional careers and advanced study, while connecting with local, regional and global communities

CSET Vision - We strive to provide a mentored educational experience to every student in our college, develop the most qualified engineers, scientists and STEM teachers, and establish our college as the preferred Master's degree provider in Minnesota.

Biological Sciences - The Department of Biological Sciences introduces students to a broad spectrum of topics related to the study of living things and helps them develop specializations that lead to a wide range of career opportunities. Faculty advisors work closely with biology majors as they identify and pursue their specialties through real-world research opportunities in our well-equipped labs.